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Just One More Episode: Predictors of Procrastination with Television and Implications for Sleep Quality

Abstract

Sleep experts have raised concern over the effects of electronic media use on sleep. To date, few studies have looked beyond the effects of duration and frequency of media exposure or examined the underlying mechanisms of this association. As procrastinatory media use has been related to lower well-being, we used data from two survey studies ($N_1 = 821$, $N_2 = 584$) to investigate (1) predictors of procrastinatory TV viewing and (2) the link between procrastinatory TV viewing and sleep quality. Findings from both studies indicate that those with a stronger viewing habit, higher TV involvement, and an eveningness preference reported more procrastinatory TV viewing. Procrastinatory TV viewing was related to subjective sleep quality, sleep latency, sleep efficiency, and daytime dysfunction. This association was fully mediated by perceived stress. As sleep is key for the replenishment of self-control, procrastinators may be setting themselves up to fail at self-regulating, a situation exacerbated by the omnipresence of media in today's society.

Keywords: procrastination, television, sleep quality, adults, eveningness

Despite the ever-growing number of competing new and interactive media, the popularity of television remains unchallenged: watching television accounts for over half of the leisure time of people aged 15 and over (Bureau of Labor Statistics, 2018). As an increasingly convenient and accessible activity, television offers numerous benefits to its viewers, such as enjoyment (Vorderer, Klimmt, & Ritterfeld, 2004) and recovery from stress and strain (Rieger, Reinecke, & Bente, 2015). However, constant access to television content comes at a cost, as research shows that television viewing challenges viewers' time budgeting and often conflicts with other obligations. In providing a pleasant and immediate escape from tasks and responsibilities (Kubey & Csikszentmihalyi, 1990), television is identified as a convenient tool for procrastination, a form of dysfunctional task delay. Research suggests that procrastinatory media use is highly prevalent in daily life (Reinecke & Hofmann, 2016), and has been associated with adverse outcomes such as increased stress and lower subjective well-being (Hinsch & Sheldon, 2013; Meier, Reinecke, & Meltzer, 2016; Reinecke & Hofmann, 2016). So far, few studies have examined procrastinatory media use with regard to television viewing. In particular, there is little understanding of the possible drivers of procrastinatory TV use, such as daily rhythms (e.g. evening viewing habits), nor its implications for key resilience factors for health, such as sleep (cf. Reinecke & Hofmann, 2016; Schnauber-Stockman, Meier, & Reinecke, 2018).

The research presented here will thus contribute to the emerging literature on TV use, procrastination, and well-being in two ways. First, we will investigate three predictors that may help explain why individuals turn to the TV to irrationally delay intended tasks (i.e., to procrastinate). In brief, we will argue that having a strong television viewing habit, an eveningness preference, and a tendency to become absorbed in the television experience may result in more procrastinatory television viewing because of the higher propensity to fail at self-regulating one's TV use.

Second, this study is the first to explore whether and how procrastinatory TV use is related to sleep quality. Accumulating evidence suggests that higher volumes of electronic media use impairs

sleep, such as reduced sleep duration, higher sleep latency, more nighttime disturbance, and more daytime fatigue (Hale & Guan, 2015). Most studies have focused on the duration and volume of media use, while much less is known about different usage styles and experiences. Prior research has reported that procrastinatory media use may elicit negative cognitive-affective states, such as stress (Meier et al., 2016) and guilt (Reinecke, Hartmann, & Eden, 2014). Sleep researchers have identified such states as predictors of poor sleep quality (Carney, Harris, Moss, Edinger, 2010). However, no study to date has tested whether they might be elicited by procrastinatory TV use. In line with an increasingly recognized paradigm of media effects research (Valkenburg, Peter, & Walther, 2016), we conceptualize the relationship between procrastinatory TV use and sleep quality as *indirect* and will explore whether cognitive-affective responses to procrastinatory media use may explain impaired sleep quality. These objectives will be addressed using survey data from two separate community samples. Findings of Study 1 will be replicated and extended in Study 2, as both studies assess the same three predictors and outcome, but focus on different underlying mechanisms (i.e., perceived stress in Study 1 and guilt in Study 2).

Procrastinatory Media Use

Procrastination is defined as “the self-regulatory failure of not exerting the self-control necessary for task engagement” (Sirois & Pychyl, 2013, p. 116), thus being characterized as a behavior highly dependent on self-control resources. When procrastinating, people typically give in to hedonically pleasant activities which deliver instant gratification, at the expense of less favored tasks, personal standards, or important long-term goals. Procrastination, contrary to strategic and rational delay, is a dysfunctional form of delay that typically leaves the procrastinator worse off, at least in the long term.

An emerging research literature has found various media (e.g., social network sites, TV, and games) to be frequently used “tools for procrastination” (Hofmann, Reinecke, & Meier, 2017; Reinecke, Meier, Aufenanger et al., 2018; Reinecke, Meier, Beutel et al., 2018). Hofmann and

colleagues (2017) identified three factors that contribute to this particular aptness of screen media such as TV as means for procrastination. First, media are deeply embedded in individuals' everyday lives. When people seek an alternative activity to procrastinate on a task, they can easily turn to proximal media options—both at work (Meier et al. 2016) and in their leisure time (Reinecke et al., 2014). Second, media use is a highly habitualized activity that individuals automatically turn to, despite imminent goal conflicts (LaRose, 2010). Third, media use, especially the use of audio-visual (TV or video) content, is an immersive activity (Busselle & Bilandzic, 2009) and provides users with an enjoyable distraction from their everyday responsibilities (Hofmann, Vohs, & Baumeister, 2012).

While one may think social and mobile media are the most tempting tools for procrastination (Hinsch & Sheldon, 2013; Meier et al., 2016), experience sampling evidence by Hofmann and colleagues (2012) shows that over half of all sampled episodes in which adult participants desired to use media were related to “watching TV/video” (Figure S3). Reinecke and colleagues (2014) found that adults who reported lower levels of state self-control (i.e., ego depletion) were more likely to perceive their TV use as procrastination. Further, Reinecke and Hofmann (2016) randomly sampled media use episodes between 9 AM and 9 PM in a sample of 215 adults. The authors found that participants experienced conflicts between TV use and “efficient time use”, “not delaying things”, or “professional advancement” in 63.2% of all sampled TV episodes, showing the highest conflict-rate among all investigated media (TV, Internet, video games). These findings strongly suggest that watching TV frequently conflicts with subjectively more important tasks and is thus perceived as procrastination.

Procrastination is often regarded as volitional, that is, as a gratification deliberately sought or obtained from media use (e.g., Myrick, 2015; Quan-Haase & Young, 2010). However, prior studies have linked procrastinatory media use to low self-control, implying that it results from an impulsive rather than a reflective decision process (Schnauber-Stockmann et al., 2018). Since procrastination is perceived as an ultimately dysfunctional delay, media users should be motivated to avoid and control

this behavior rather than actively pursue it. Compared to procrastination as a conscious motivation for television viewing, the unintentional act of procrastination with TV has received less attention in media research.

Predictors of Procrastinatory Television Viewing

As a consequence of impulsive media selection (Schnauber-Stockmann et al., 2018), procrastinatory media use is described as an outcome of self-control failure (Meier et al., 2016; Reinecke & Hofmann, 2016). Currently, a single theoretical framework that integrates both predictors and consequences of procrastination as deficiently self-regulated media use is missing from the literature (Hofmann et al., 2017). Accordingly, and based on a recent overview of theoretical pursuits in communication research (DeAndrea & Holbert, 2017), this paper aims to contribute to theory development on media use and self-regulation in two ways: (a) by integrating previously disconnected literatures on predictors of procrastinatory TV use and (b) by specifying two causal mechanisms (stress and guilt) that qualify how procrastinatory TV use may affect sleep quality. In so doing, we build on an increasingly recognized theoretical paradigm of communication research that conceptualizes media effects as indirect (Valkenburg et al., 2016). In the following, we continue by identifying three predictors of procrastinatory TV use which are rooted in, or have been linked to, deficient self-control.

Habitual TV Viewing

As mentioned above, media use may be a frequent procrastinatory activity because it tends to be highly habitualized (Hofmann et al., 2017). Habits refer to “learned dispositions to repeat past responses” (Wood & Neal, 2007, p.843). Habits form when the same behavior, such as media use, is frequently performed under similar conditions until it is finally triggered automatically by external (e.g., specific locations, times of day, or preceding activities) or internal (e.g., moods or need states) cue. As a result of this automatization, habits are robust: once the association between behavior and context cues have formed, behavioral responses are triggered irrespective of current goals or needs

(LaRose, 2010; Wood & Rnger, 2016). The inhibition of a habitual response thus requires active self-control efforts to override the impulse of performing the habitualized behavior.

The fact that the impulse of performing a habitualized behavior is hard to resist suggests that the more habitualized a behavior is, the more frequently it will be performed even if it delays other, more important tasks. Stronger media habits should thus make media users more susceptible to procrastinatory media use. In fact, in two survey studies by Meier et al. (2016), university students with stronger Facebook checking habits showed an increased tendency to use Facebook for procrastination. A diary study by Schnauber-Stockmann et al. (2018) further demonstrated that stronger media habits were associated with more impulsive TV selection, resulting in more frequent procrastinatory TV use. We thus propose that:

H1: Habitual television viewing is positively related to the frequency of procrastinatory television viewing.

TV Involvement

Sirois and Pychyl (2013) suggest that procrastination is driven by short-term mood repair: the negative affect associated with a particular task urges people to optimize their mood, often by indulging in procrastinatory activities. This tendency to prioritize the short-term gain of positive affect (obtained via hedonically pleasant activities) over long-term goals may explain the appeal of TV viewing as a procrastinatory activity. A large body of literature describes television viewing as an immersive experience: we escape reality to become engrossed or transported in a television narrative. The degree to which one enjoys television viewing often depends on the degree of involvement in the viewing experience. When involvement is absent, this often results in a negative evaluation of viewing experiences, because the viewer “just could not get into it” (Green, Brock, & Kaufman, 2004). Notably, such involvement has also been associated with time dissociation (Agarwal & Karahanna, 2000; Sherry, 2004): A portion of attentional resources is shifted to the processing of incoming media stimuli, which leaves fewer resources available to keep track of other information,

such as time and surroundings (Luthman, Bliesener, & Staude-Müller, 2009). Losing track of time during media use was, however, evaluated positively in previous research: escaping boredom and stress is one of the major benefits of losing track of time (Tobin & Grondin, 2009), which could drive media users to prolong their usage. Additionally, however, losing track of time should naturally result in an unintended delay of other tasks.

In other words, involvement with a television narrative might explain the unintended act of procrastinating with television: we get caught up in watching TV, and incidentally end up procrastinating. Knowing that such positive affect is rather acutely disrupted upon ceasing television viewing (Kubey & Csikszentmihalyi, 1990), viewers are likely to prolong their positive viewing experience, even against their better judgment. In previous research, Sirois (2014a) linked trait procrastination to higher levels of absorption, concluding that procrastinators engage in avoidant coping by becoming absorbed in pleasurable activities. Meier and colleagues (2016) found that higher levels of Facebook enjoyment predicted the frequency of procrastination with Facebook. To date, no study has addressed the association between involvement and procrastination for traditional media such as television. Media involvement has been operationalized with a variety of distinct, yet overlapping concepts such as absorption, flow, or transportation. To take this variety of concepts of involvement into account, we include two different operationalizations in our studies: Study 1 addressed the *involvement during viewing* as a predictor of procrastinatory media use whereas the disposition to become transported or *transportability* (Dal Cin, Zanna, & Fong, 2004) was assessed in Study 2.

H2: Television involvement is positively related to the frequency of procrastinatory television viewing.

Diurnal Preference

Diurnal preference, or morningness-eveningness preference, reflects individual differences in the preferred timing of sleep and wakefulness and the time of day for carrying out challenging tasks.

People with an eveningness preference (typically called “owls”) prefer a later than average bedtime and rise time and function to the best of their ability later in the day, whereas the opposite applies to morning types (typically called “larks”) (Roenneberg, Wirz-Justice, & Mellow, 2003).

Overall, it has been shown that evening types engage in behavior indicative of self-control failure more frequently: they consume more substances such as caffeine, alcohol, and nicotine, have poorer eating and exercising habits, and show poorer academic performance (Gau et al., 2007; Schlarb, Sopp, Ambiel, & Grünwald, 2014). In recent years, studies have explicitly tested the link between self-control and diurnal preference and consistently reported that morning types appear to have superior self-control ability compared to evening types (Digdon & Howell, 2008; Owens, Dearth-Wesley, Lewin, Gioia, & Whitaker, 2016).

There are several possible explanations for this association. One might be their sleep schedule: evening types have a less consistent sleep schedule and more sleep debt, which undermines effective self-regulation (Barber & Munz, 2011; Pilcher, Morris, Donnelly, & Feigl, 2015). Another explanation could be circadian misalignment or *social jetlag*: society demands that evening types perform most of their responsibilities in their non-preferred time, which may deplete their self-control resources to a larger extent than morning types (Owens et al., 2016). Evening types may also show more self-control failure because they are simply more likely to be awake at night, a more temptation-prone time slot of the day (Walker, Christopher, Wieth, & Buchanan, 2015). A final explanation may lie in their differing time perspective. Whereas evening types have a more present-hedonistic time perspective (i.e., a preference for immediate pleasure with less regard for future consequences), morning types are more future-oriented (i.e., striving towards future goals) (Díaz-Morales, Ferrari, & Cohen, 2008; Stolarski, Ledzińska, & Matthews, 2013).

Research on procrastination and diurnal preference is limited, but Ferrari and colleagues (1997) found that procrastinators described themselves more frequently as night persons than day persons. Eveningness has been linked to more academic (Hess, Sherman, & Goodman, 2000) and

general procrastination (Digdon & Howell, 2008). Díaz-Morales et al. (2008) reported that evening types engage in avoidant procrastination, suggesting that they postpone certain tasks until they are able function at the best of their ability (i.e., later in the day). Finally, Tonetti et al. (2016) reported that evening types have an avoidant decision-making style, which is similar to the decision-making style of procrastinators.

Concerning the relation between diurnal preference and media use, research consistently finds that people with an eveningness preference spend more time in front of screens (Kauderer & Randler, 2017; Vollmer, Michel, & Randler, 2012). Evening types report increased media use prior to bedtime and in bed (Fossum, Nordnes, Storemark, Bjorvatn, & Pallesen, 2014; Polos et al., 2015) and seem to be more prone to problematic media use (Demirhan, Randler, & Horzum, 2016; Randler, Horzum, & Vollmer, 2014). Taken together, eveningness has been linked to reduced self-regulation and higher procrastination. Moreover, evening types devote more time to media than morning types. Integrating these insights, we propose the following hypothesis:

H3: Morningness preference is negatively related to the frequency of procrastinatory television viewing.

Procrastinatory TV Use and Sleep

A large body of procrastination research has found dysfunctional delay to be linked to decreased health and well-being (e.g., Sirois & Kitner, 2015; Steel, 2007). Likewise, several studies have replicated such negative effects for procrastinatory media use. Reinecke and colleagues (2014) found procrastinatory TV use to be indirectly linked to decreased vitality by increasing the negative self-conscious emotion of guilt. Reinecke and Hofmann (2016) reported that procrastinatory TV viewing was related to decreased subjective well-being via increasing negative self-evaluations. The present study advances this line of work by investigating whether procrastinatory TV use also affects a focal indicator of both physical and mental health, namely sleep quality.

Sleep Quality

Sleep may be regarded as a public health issue: statistics show that around one in three adults does not sleep the recommended amount (Schoenborn & Adams, 2010) and adolescents sleep on average 1-2 hours less than they actually need (Hysing et al., 2013). Given the range of repercussions that impaired sleep can have on physical and mental health (Strine & Chapman, 2005), the topic of sleep has attracted increasing scholarly interest over the past decade. The measurement of sleep quality requires an analysis of multiple sleep indicators, which can be captured objectively (using polysomnography or actigraphy) or subjectively (using self-reports). Comparison studies have shown that while self-reports are susceptible to recall bias, they are a valid way to capture sleep quality (Wolfson et al., 2003). The Pittsburgh Sleep Quality Index (Buysse et al., 1989) is by far the most widely used and well-validated instruments in this regard. It comprises seven indicators of sleep quality, which refer to both quantitative (sleep duration, sleep latency, sleep efficiency, sleep disturbance, sleep medication) and qualitative indicators (subjective sleep quality, daytime dysfunction) of sleep quality (Pilcher et al., 1997). The summated score of the components provides a comprehensive assessment of sleep health and daytime fatigue. Moreover, it allows untangling individual associations with the different aspects of sleep quality (Buysse et al., 1989). This study will thus employ the Pittsburgh Sleep Quality Index in both studies.

Procrastination and Sleep

Research on the link between procrastination and sleep is limited. Sirois, Melia-Gordon, and Pychyl (2003) studied the relationship between procrastination and general health behaviors and included getting sufficient sleep as one of their items. Sirois, Eerde, and Argiropoulou (2015) found trait procrastination to be related to some, but not all indicators of the Pittsburgh Sleep Quality Index, that is, sleep latency, daytime dysfunction, use of sleep medication, and sleep duration. Based on these associations, they concluded that procrastination impaired the quality of sleep rather than inducing night wakings. Furthermore, recent studies on bedtime procrastination have found that a

significant proportion of adults needlessly procrastinated bedtime, which partly explained reduced sleep duration (Kroese, De Ridder, Evers, & Adriaanse, 2014).

In sum, the relationship between procrastination and sleep is understudied and no study to date has investigated whether procrastinatory TV use may harm sleep quality. Meta-analyses on the effects of screen time on sleep have identified media usage as a risk factor for poor sleep quality, sleep insufficiency, and night wakings (for an overview, see Hale & Guan, 2015). However, how specific usage patterns, such as procrastinatory TV use, relate to sleep is largely unknown. Following these findings on procrastination, media use, and sleep, we propose that procrastinatory television viewing will contribute to poorer sleep quality:

H4: Procrastinatory television viewing is negatively related to sleep quality.

Two Underlying Mechanisms of Cognitive-Affective Appraisal

A variety of studies have demonstrated that procrastination can have adverse consequences for psychological well-being, in large part because procrastinators experience negative cognitive-affective appraisal of their behavior, for instance, in the form of rumination or worry (e.g., Stainton, Lay, & Flett, 2000). Carney and colleagues (2010) proposed that these ruminations may trigger arousal, negative mood, and distress, which could undermine procrastinators' sleep quality. This study, in line with recent theoretical conceptualizations of media effects (Valkenburg et al., 2016), thus conceptualizes the associations between procrastinatory media use and sleep quality as *indirect*, transmitted through the mechanisms of stress and guilt. Both represent negative cognitive-affective reactions to conflicts between situational demands and individual coping resources or personal goals, respectively, but have not been tested as two competing mechanisms linking procrastinatory media use to poor sleep quality

Stress. Stress has been repeatedly identified as one of the main outcomes of procrastination (Sirois et al., 2003; Tice & Baumeister, 1997). Researchers proposed that negative self-evaluation during procrastination may explain why procrastinators feel stressed. Procrastinators keep ruminating

over past and current procrastination, lowering their overall appraisal of themselves and increasing stress (Stainton et al., 2000). In addition, postponing a task until the very last minute and then rushing to get it done will likely bring along higher levels of stress (Fee & Tangney, 2000). Tice and Baumeister (1997), for instance, found that procrastination reduced stress initially, but procrastinators experienced higher levels of stress near the deadline of a task than non-procrastinators.

Support for advancing stress as a mediator of procrastinatory media use on sleep can be found in the Procrastination-Health Model, which describes increased levels of stress as one of the two paths connecting procrastination with negative health outcomes (Sirois, 2007; Sirois et al., 2003). This proposition has been supported in multiple studies (Sirois, 2007; Sirois et al., 2003; Sirois & Tosti, 2012). In fact, the model has even been tested with reference to sleep quality: Sirois et al. (2015) revealed a moderate but significant effect of procrastination on sleep quality, which was fully mediated by perceived stress. Based on these insights, we propose that stress may explain the association between procrastinatory television viewing and sleep quality:

H5a: Perceived stress will mediate the association between TV use as procrastination and sleep quality.

Guilt. We propose guilt as a second mechanism explaining why procrastinatory television viewing may be related to sleep quality. Procrastination has been tied to feelings of guilt in previous research (Fee & Tangney, 2000; Pychyl, Lee, Thibodeau, & Blunt, 2000). The notion that procrastinatory media use may invoke similar feelings of guilt is supported by Panek (2014), who found that college students with lower self-control spent more time on media and consequently felt guilty about doing so. Furthermore, Reinecke et al. (2014) concluded that those who used television in the evening to recover from a day's work experienced higher levels of guilt when they perceived their media use as a form of procrastination. Procrastinatory use of both online and offline media was also related to increased levels of negative self-related emotions and reduced levels of situational well-being (Reinecke and Hofmann, 2016). Moreover, a study by Hairston and Shpitalni (2016) has

reported that increased negative mood mediated the association between procrastination and sleep disturbance. We therefore hypothesize that guilt may mediate the association between procrastinatory media use and sleep quality.

H5b: Guilt will mediate the association between TV use as procrastination and sleep quality.

Figure 1 shows the theoretical model that will be examined in two studies among community samples of adults.

[FIGURE 1 AROUND HERE]

Study 1

Method

Data collection. In November 2014, forty-six undergraduate students of a media research methodology class received course credit for conducting face-to-face interviews by means of standardized questionnaires. They received an interviewer training prior to data collection, with a known positive effect on interview quality (Loosveldt & Billiet, 1988). A two-step random sampling method was used. First, we randomly selected cities or villages in Flandres, Belgium, one for each interviewer. Second, 20 addresses from the telephone directory of each city or village were selected using a random selection protocol. Interviewers were instructed to proceed to the first building to the left of the building on the address list. To avoid limiting the sample to those at home and most likely to open the door, students were instructed to interview the adult (≤ 18 years old) member of the household who was the first in line to celebrate his or her birthday. They had to try to initiate contact three times before moving on to a replacement address to reduce undersampling of those with an active lifestyle. The study received ethical clearance from the Institutional Review Board of the KU Leuven, and informed consent was obtained from all respondents.¹

¹ In addition to the data presented here, the survey also assessed additional variables addressing the role of media use on bedtime-procrastination. The respective findings are published in Exelmans and Van den Bulck (2017). As a pooled data collection was conducted for both studies, the methods sections of both publications show strong similarities. Besides this methodological overlap, however, both papers address significantly different research topics and make independent contributions to the literature.

Sample. In total, 1916 addresses were visited, of which 586 (31%) refused participation and 509 (27%) did not answer the door after three visits, resulting in a sample of 821 completed questionnaires² (response rate = 43%). The sample consisted of 59% women and 41% men. Respondents' age ranged between 18 and 90 years ($M = 45.60$, $SD = 18.01$). Approximately one in five (21%) of the respondents had obtained a university degree, and almost one in three (32%) had received a college degree, 39% a degree of secondary school, and 7% a degree of primary school. Six respondents (1%) had no degree. There were no significant differences between population values and our sample concerning gender, $\chi^2(1, N = 821) = 2.561$, $p = .109$, and age, $\chi^2(7, N = 821) = 8.868$, $p = .262$. Highly educated respondents were overrepresented in our sample, $\chi^2(4, N = 821) = 19.996$, $p < .01$.

Measures. We conducted confirmatory factor analyses (CFA) on all multi-item Likert scales. We applied four fit indices to evaluate the fit of our measurement models: the minimum discrepancy statistic (CMIN/df), the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square of residuals (SRMR). Detailed results of the CFA's and reliabilities can be found in Supplement 1. Aside from the measure of perceived stress, these analyses suggest generally acceptable levels of fit and reliability for the scales.

The Diurnal Scale (Torsvall & Akerstedt, 1980) measures *morningness preference* using seven items, each with four answer options. For each item, respondents were asked to choose their preferred time of the day for various activities (e.g., "When do you usually begin to feel the first signs of tiredness and need for sleep?"). Higher scores indicate a greater morningness preference.

Based on Gardner, Abraham, Lally, & de Bruijn (2012), we created a *habitual television viewing* scale by adapting the four automaticity items of the Self-Report Habit Index (Verplanken & Orbell, 2003). Items (e.g., "Watching television during the evening is something I do automatically")

² We verified a sub-sample the data collected by each interviewer and checked for impossible or implausible values across the data set with the paper questionnaires. Remaining missing values represent a respondent who did not wish to answer a particular question.

were rated on a seven-point scale (1 = completely disagree, 7 = completely agree). A higher score indicates a stronger evening viewing habit.

We measured the extent to which respondents *experience involvement when watching television* by adapting nine items from prior research (Agarwal & Karahanna, 2000; Koufaris, 2002; Lee & LaRose, 2007). The items tapped into three facets of involvement: time dissociation (three items, e.g., “Time flies when I watch television”), enjoyment (three items, e.g., “I have fun”), and focused immersion (three items, e.g., “My attention is completely focused on watching TV”). Higher scores reflect more TV involvement.

Following prior research (Meier et al., 2016; Reinecke et al., 2014) we adapted five items from Tuckman's (1991) Procrastination Scale to assess *procrastinatory television viewing* (e.g., “I watched television even though I have more important things to do”). Respondents rated their frequency of procrastinating with television on a seven-point scale (1 = never, 7 = very often).

The short form of the Perceived Stress Scale was used to capture respondents' *perceived level of stress* during the past month (Cohen, Kamarck, & Mermelstein, 1983; Cohen & Williamson, 1988). The scale contains four items rated on a five-point scale (1 = never, 5 = very often).

Sleep quality was measured using the Pittsburgh Sleep Quality Index (Buysse et al., 1989). The measure consists of 19 items that assess sleep quality over the past month. Scoring instructions for the scale are documented by Buysse et al. (1989), who describe seven components (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction), each scored on a 0–3 scale. The components can be summated into an overall score of 0–21, with lower scores indicating better sleep quality. Principal component factor analysis for the PSQI yielded one factor (eigenvalue 2.71 with loadings >.433). Cronbach's alpha for the index was .71, which corresponds to findings from previous research (Lund, Reider, Whiting, & Prichard, 2010).

We also enquired participants' gender (0 = male, 1 = female), age, educational level, perceived physical health status, and evening television viewing volume (hours of television watched after 8 PM) as *control variables*.

Analytical procedure. Means, standard deviations, and zero-order correlations were computed using SPSS 24. The hypothesized relationships were tested with the AMOS 25.0 statistical package for structural equation modeling (SEM), using the maximum likelihood method. The same four fit indices that were used in Study 1 were applied (CMIN/df, CFI, RMSEA, SRMR). As the SEM approach does not allow the sample to include missing values (Honaker & King, 2010), listwise deletion was performed, deleting 92 cases from the sample. Bootstrapping with 95% confidence intervals (CIs) was used to test the significance of the indirect paths. When the 95% CI does not include zero, the indirect effect can be said to significantly differ from zero at the .05 level.

Results

Preliminary analyses. Table 1 shows the means, standard deviations, and zero-order correlations for the key variables. Average use of TV for procrastination was $M = 9.88$ ($SD = 5.34$) on a scale ranging between 5 and 35, indicating a skewed distribution and mirroring previous findings (Schnauber-Stockmann et al., 2018). However, the score was inversely related to age, $r = -.474$, $p < .001$, indicating that TV use as procrastination declined with age. More than one in three respondents (35%) reported a total PSQI score above 5, categorizing them as poor sleepers. Average sleep quality was positively related to age, meaning that older people reported a higher score, thus a poorer sleep quality. Women reported poorer sleep quality than men, $t(757.05) = -4.109$, $p < .001$.

We examined the association between procrastinatory TV use and sleep quality. As there was no significant correlation between procrastinatory TV use and our composite index of sleep quality, we explored whether particular subcomponents of the PSQI were related to procrastinatory TV use. There were significant associations with four components: subjective sleep quality, sleep latency, sleep efficiency, and daytime dysfunction (Table 1): more procrastinatory TV use was associated

with more problems in these components of sleep quality. Consequently, our SEM analyses retained these four indicators of sleep quality for further analysis.

[TABLE 1 AROUND HERE]

Hypothesized model. We computed a structural equation model (SEM) with two mediators (i.e., TV use as procrastination and perceived stress), modeling them in a serial order between the aforementioned predictors (i.e., morningness preference, habitual viewing, and TV involvement) and the four sleep indicators. The four dependent sleep variables were allowed to correlate. The three dimensions of TV involvement were used to estimate the second-order factor *TV involvement*. Finally, we controlled for respondents' gender, age, educational level, perceived physical health, and evening television viewing volume by adding them as predictors for TV use as procrastination, perceived stress, and the four dependent sleep variables in our SEM. Control variables were allowed to covary with each other and the three predictors (morningness preference, habitual viewing, and TV involvement).

Analyses yielded a good model fit, $CMIN/df = 2.228$, $CFI = .943$, $RMSEA = .041$ [.038, .045], $SRMR = .060$. Figure 2 presents the standardized β coefficients for the hypothesized relationships. Results confirmed H1 - H3: a stronger television viewing habit, $\beta = .216$, $SE = .032$, $p < .001$, greater involvement experienced during television viewing, $\beta = .117$, $SE = .066$, $p < .01$, and lower morningness preference, $\beta = -.261$, $SE = .079$, $p < .001$, were related to increased procrastinatory TV use. While television viewing as procrastination was positively related to perceived stress, $\beta = .234$, $SE = .018$, $p < .001$, it did not show direct associations with any of the sleep outcomes. Higher levels of perceived stress were associated with lower subjective sleep quality, $\beta = .406$, $SE = .145$, $p < .001$, higher sleep latency, $\beta = .311$, $SE = .169$, $p < .001$, lower sleep efficiency, $\beta = .231$, $SE = .140$, $p < .001$, and more daytime dysfunction, $\beta = .498$, $SE = .158$, $p < .001$.

We continued with a mediation analysis to test whether stress mediated the association between TV use as procrastination and the four sleep indicators (H5a). Results of the bootstrapping procedure (2000 samples, 95% CIs) revealed that TV use as procrastination was indirectly related to the four sleep constructs through perceived stress (subjective sleep quality: .062, 95%CI [.032, .107], $p < .01$; sleep latency: .061, 95%CI [.030, .110], $p < .001$; sleep efficiency: .041, 95%CI [.018, .081], $p < .001$; daytime dysfunction: .077, 95%CI [.041, .132], $p < .01$). Perceived stress fully mediated this association: TV use as procrastination was significantly related to the four sleep constructs in a model without perceived stress as a mediator (H4), but these associations turned non-significant after including the mediator. Hypothesis 5a was thus confirmed.

[FIGURE 2 AROUND HERE]

Study 2

Study 2 was designed to test whether (1) the relationships between predictors and consequences of procrastinatory TV use observed in Study 1 could be replicated in a second sample of adults and (2) guilt, alternatively to stress, may explain the association between procrastinatory television viewing and sleep quality. Accordingly, we replicated most of the assessments from Study 1. However, to account for the conceptual pluralism in research on TV involvement, instead of measuring TV involvement during TV use we captured respondents' transportability, that is, their tendency to become transported into a TV narrative. In addition, we examined feelings of guilt when watching television as an alternative explanation for the association between TV use as procrastination and sleep quality. This way, Study 2 aims to replicate and expand the findings of Study 1.

Method

Data collection. A quota sample was used, stratified by gender, age, and educational level. Analogously to Study 1, data collection was performed by undergraduate students enrolled in a media research methodology class. In November 2016, twenty-three students contacted participants (≥ 18

years old) and invited them to participate in an online survey. Informed consent was obtained from all respondents. Fifty respondents participated via paper-and-pencil surveys. The study was presented as a study on leisure time and well-being to blind the relationships we were studying. This research was conducted in accordance with the ethics requirements of the Institutional Review Board of the KU Leuven.³

Sample. A total of 584 questionnaires were completed. The sampled population was a proportional representation of adults in for gender, $\chi^2(1, N = 584) = .000, p = .99$, age, $\chi^2(6, N = 584) = 1.008, p = .99$, and education, $\chi^2(2, N = 584) = .302, p = .86$. Respondents' mean age was 48.5 ($SD = 18.8$, 18-96 years old) and the sample contained 51% women.

Measures. We collected data on the same control variables as we did for Study 1 (i.e., gender, age, educational level, perceived physical health status, and evening viewing volume). Morningness preference, habitual TV viewing, TV use as procrastination, and sleep quality were also assessed with the same measures as in Study 1. Procrastination television viewing was scored on a five-point Likert scale (1 = never, 5 = very often). We conducted CFA on all multi-item Likert scales and computed Cronbach's alpha before proceeding with the analyses. The results from the factor analyses paralleled those from Study 1 and can be found in Supplement 1. Cronbach's alpha for the PSQI for this study was .64, which is lower than that of Study 1, but comparable to the reliability found in previous research (Exelmans & Van den Bulck, 2014).

Transportability was assessed with the nine-item Transportability Scale (Dal Cin, Zanna, & Fong, 2004). Items (e.g., "When I watch television, I can easily envision the events in the story")

³ In addition to the data presented here, the survey also assessed additional variables addressing the effects of in-bed media use on sleep latency. The respective findings are published in Exelmans, Gradisar, and Van den Bulck (2018). As a pooled data collection was conducted for both studies, the methods sections of both publications show strong similarities. Besides this methodological overlap, however, both papers address significantly different research topics and make independent contributions to the literature.

were rated on a five-point scale (1 = does not apply at all, 5 = fully applies). A higher score indicates higher transportability.

Finally, we adapted items of the State Guilt Scale (Marschall, Saftner, & Tangney, 1994) to examine the extent to which respondents experience *feelings of guilt when watching TV in general*. Respondents rated items such as “When I watch TV, I feel bad about it” on a five-point scale (1 = does not apply at all, 5 = fully applies).

Analytical procedure. A second SEM was computed, including the same dependent sleep variables and covariances as Study 1. Additionally, we incorporated transportability (instead of TV involvement) as a predictor of TV use for procrastination and guilt as the second mediator (instead of perceived stress). In line with Study 1, the measurement models of all latent factors were satisfactory.

Results

Table 2 depicts the means, standard deviations, and zero-order correlations for the key variables included in Study 2.

[TABLE 2 AROUND HERE]

The model showed a good fit to the data, $CMIN/df = 2.310$, $CFI = .927$, $RMSEA = .050$ [.046, .054], $SRMR = .055$. Figure 3 presents the standardized β coefficients for the hypothesized relationships. Results confirmed the associations of Study 1 for H1 – H3: a stronger television viewing habit, $\beta = .203$, $SE = .020$, $p < .001$, higher transportability, $\beta = .181$, $SE = .046$, $p < .001$, and a greater eveningness preference, $\beta = -.134$, $SE = .051$, $p < .01$ were associated with increased use of TV as a tool for procrastination. In turn, TV use as procrastination was positively related to guilt experienced when watching TV, $\beta = .359$, $SE = .061$, $p < .001$, and to one of the four sleep indicators, that is, daytime dysfunction, $\beta = .126$, $SE = .054$, $p < .05$ (H4). Finally, there was no significant association between guilt when watching television and the four sleep indicators, which is contrary to what we expected (H5b). Consequently, results from the bootstrapping procedure

(listwise deletion, $N = 530$), 2000 samples, 95% CI) indicated no indirect effects of TV use as procrastination on sleep via guilt.

[FIGURE 3 AROUND HERE]

Discussion

The present study aimed at expanding research on procrastination, media use, and well-being by investigating three antecedents of procrastinatory TV use and relating procrastinatory TV use to sleep quality, a central determinant of psychological well-being and physical health. Our findings from two cross-sectional studies among community samples of adults led to three conclusions.

First, a higher eveningness preference, stronger television viewing habit, and greater TV involvement were related to a higher frequency of TV use for procrastination. On average, our set of predictors explained 31% of the variance in procrastinatory television viewing. Prior studies have linked an eveningness preference to more self-control failure, procrastination (Digdon & Howell, 2008; Owens et al., 2016), and greater media usage (Fossum et al., 2014; Vollmer et al., 2012). By investigating procrastinatory television viewing, we combined these two research lines and confirmed that evening types are more inclined to procrastinate by watching television. It is somewhat surprising that communication scholars have largely overlooked diurnal preference as a determinant of media consumption. Evening types are far from representing a minority: it is estimated that 25-30% of the population identify as owls (Paine, Gander, & Travier, 2006). In order to understand what drives people's media-related self-control failures, future research may thus significantly benefit from incorporating diurnal preference in their studies.

Regarding habit strength, our results are consistent with recent studies indicating that automatic, non-conscious processes are at play when people engage in procrastinatory media use (Meier et al., 2016; Schnauber-Stockmann et al., 2018). Moreover, procrastinatory television viewing was more prevalent among those who reported higher involvement during viewing (Study 1) and who had a higher disposition to become transported into television narratives (Study 2). This

corroborates the argument of Sirois and Pychyl (2013) and Sirois (2014a) who described procrastination as a mood repair strategy: the opportunity to psychologically detach from an unpleasant task and the intense feelings of enjoyment associated with transportation into narratives may promote the procrastinatory usage of audiovisual media.

Second, our results show no significant relationship between procrastinatory TV use and the overall index score of sleep quality. Exploratory analyses were conducted to examine possible associations with the subcomponents of the index, which showed that adults who engaged more frequently in procrastinatory television viewing also reported a poorer subjective sleep quality, longer sleep latency (i.e., it took them longer to fall asleep after lights out), lower sleep efficiency (i.e., they spent less time sleeping in relation to the time they spent in bed), and greater daytime dysfunction (e.g., having more trouble staying awake during daytime activities). Our findings concur with those of Sirois and colleagues (2015), who used the same measure to capture sleep quality in a student sample. The (non-) significant associations with these particular subdimensions of sleep quality suggest that procrastination with media does not seem to affect total sleep time *per se*, but rather hinders the onset of sleep and influences how well rested one feels during the day.

Previous research has claimed that television viewing should *not* be considered a risk factor for sleep (Bartel & Gradisar, 2017). This study highlights the importance of differentiating between the specific indicators of sleep quality and to consider users appraisal of their media consumption. The multidimensionality of sleep quality has been emphasized in sleep research (Buysse et al., 1989). Our findings show that procrastinatory television viewing does not seem to cut back on the length of sleep, but rather seems to compromise the recovery function of sleep. Our findings seem to hint that a user's negative appraisal of television viewing may trigger pre-sleep worries and rumination, which extends the time it takes to fall asleep and increases the likelihood of feeling unrefreshed upon awakening. Longer sleep latency, daytime fatigue, and dissatisfaction with sleep are core symptoms of insomnia, one of the most prevalent sleep disorders in adults (Roth, 2007). Among adults, it is not

uncommon that media use is not related to the *quantity* of sleep: instead of displacing sleep time, studies consistently showed a process of *time shifting*, whereby increased media use was associated with later bedtimes and rise times, and had therefore no effect on sleep duration (Exelmans & Van den Bulck, 2015). All in all, this finding contributes to the growing body of literature on the implications of procrastination for health and well-being and highlights a particular role for television as a facilitator of these effects. Further research should be undertaken to examine which media consumption patterns are most detrimental to sleep quality, and to which indicators of sleep quality in particular.

Third, we discovered that perceived stress fully mediated the association between TV use as procrastination and sleep outcomes. The procrastination-health model (Sirois, 2007; Sirois et al., 2003) postulated that stress is one of the two pathways through which procrastination may be associated with poorer health outcomes. Our research supported this hypothesis regarding sleep quality, which is consistent with the findings from Sirois and colleagues (2015). In Study 2, we found that adults who frequently procrastinate by watching television reported higher feelings of guilt during viewing, which mirrors the findings from Panek (2014) and Reinecke et al. (2014). However, this ruminative affective state was not a significant predictor of sleep outcomes. Two points regarding these different results warrant further investigation. First, stress and guilt have some conceptual overlap as a negative cognitive-affective response but are significantly different as well. Guilt refers to an adaptive response to a violation of personal standards that is likely to motivate constructive coping. It involves negative affect and internal attribution. Stress refers to a type of anxiety in the face of overwhelming situational demands that cannot be met by personal coping resources. Guilt can therefore be a source of stress, which would imply an alternative temporal order in our model. Second, there is a difference in the assessment of stress and guilt that is worth highlighting. We queried perceived levels of stress over the past month vs. feelings of guilt when watching television. As such, this study compared general levels of stress to TV-related state feelings

of guilt. Both of these points may partly explain why stress was a significant mediator, while guilt was not. Future research may benefit from probing stress while watching TV or emotional responses to episodes of procrastinatory TV use on a situational level (see, e.g., Reinecke & Hofmann, 2016).

Our results provide useful insights for the development of targeted interventions to improve sleep quality. First, our findings suggest that sleep quality may be improved among procrastinators by reducing stress levels. It has been demonstrated that practicing self-compassion (Sirois, 2014b), mindfulness (Sirois & Tosti, 2012), or coping strategies may prove useful in this regard. Increasing self-compassion and mindfulness broadly implies taking a less critical, non-judgmental stance towards oneself, or in other words, being less harsh. In addition, use of coping strategies that focus on tackling the source of stress rather than avoiding it (i.e., adaptive vs. maladaptive coping) has been linked to lower stress levels among procrastinators (Sirois & Kitner, 2015). While our results reveal the role of stress as an underlying mechanism of the relationship between procrastinatory media use and sleep outcomes, it is recommended that future research examines alternative explanations. For example, it has been proposed that uncompleted tasks impair sleep quality because they linger in our minds more strongly than completed tasks. They reduce recovery during leisure time and increase rumination and cognitive effort before sleep (Kühnel, Bledow, & Feuerhahn, 2016; Syrek & Antoni, 2014). In addition, even though we did not find any association with sleep duration, it would be interesting to examine whether procrastinatory media use during the evening may delay bedtime (Exelmans & Van den Bulck, 2017). Second, our two studies identified habit strength, eveningness preference and TV involvement as predictors of procrastinatory TV use. Post-hoc analyses showed that these predictors are indirectly related to the sleep quality indicators via stress. Consequently, sleep quality may be indirectly improved by targeting these drivers of procrastinatory TV use. Intervention studies might consider the modification of non-conscious media selection (i.e., habits) in order to reduce the dilatory use of television and media in general. Situation or stimulus control, restraint standards, and implementation intentions have been described as valuable strategies in this

regard (Hofmann & Kotabe, 2012). There is little empirical research on ways to reduce high media involvement, but studies among gamers have found that setting a timer or keeping a clock in sight are frequently employed to reduce time dissociation (Woods et al., 2007). Finally, it has been suggested that consuming melatonin in the afternoon, exposure to bright light in the morning, and gradually advancing one's sleep schedule might prove useful for advancing one's circadian clock and thus shift towards morningness (Revell et al., 2006)

Finally, on a more general level, this paper contributes to theory development on media use and self-regulation in two ways (DeAndrea & Holbert, 2017). First, by integrating previously disconnected literatures from communication, psychology, and medicine, we show that both TV-related (i.e., evening TV habits, TV involvement) and individual difference variables relevant for general self-regulation (i.e., diurnal preference) drive media-related self-control failures (i.e., procrastinatory TV use). Specifically, (a) *how and when* individuals *select* TV content (i.e., evening TV habits, general diurnal preference) and (b) *how engaged* they *process* TV content (i.e., TV involvement and transportability) independently explained how often the surveyed adults procrastinated by watching TV. Second, we tested two competing mechanisms that relate procrastinatory TV use indirectly to lower sleep quality and found that general stress, but not guilt about TV viewing, explained this link. Together, these findings have clear implications for the future development of integrative theoretical models of media use and self-regulation. These models will need to include not just general psychological variables that specify individual differences and situational factors contributing to successful or failed media-related self-control; instead they will also need to take the specifics of media selection (e.g., impulsive vs. reflective media choices, usage contexts such as the time of day) and content processing (e.g., involvement with narratives, interactivity) into account. Furthermore, the potential consequences of deficiently self-controlled media use are unlikely to be direct and uniform. In contrast, our results suggest that the effects of deficiently self-controlled media use are likely to depend on users' cognitive-affective reactions to

their media-related self-control failures (e.g., perceived stress). This cognitive-affective appraisal of media usage may thus fully transmit, or at least strengthen, any negative effects of media-related self-control failure.

Limitations

Several limitations must be acknowledged. Our cross-sectional design does not allow an assessment of causality. The findings from our model, while theory-driven, must be interpreted with caution. For example, as it has already been reported that self-control resources are highly dependent on sleep, it is equally possible that people with poorer sleep engage in more dysfunctional, procrastinatory media use (Kühnel et al., 2016). Alternatively, the relationship between sleep and procrastination may be circular: poor sleep quality has been associated with reduced self-control (Barber & Munz, 2011), in turn increasing the risk of engaging in procrastinatory media use. The same reasoning can be applied to the relationship between procrastinatory TV viewing, and stress and guilt. However, two longitudinal studies by Tice and Baumeister (1997) identified stress as an outcome of procrastination, rather than a predictor. Moreover, procrastination should not be misunderstood as a form of escapism: escapism can be thought of as a stress-coping response, likely to be influenced by current (life) stressors. Procrastination, in contrast, is conceptualized as a self-control failure rather than a coping response and thus less likely to be influenced by stress as a predictor (Meier et al., 2018). Regarding guilt, it is important to note that our measure specified guilt about watching television in general, and not specifically about procrastinating with television. In other words, our measure of guilt about general television viewing is unlikely to be a predictor of procrastinatory television viewing. All in all, the causal chain of this study remains hypothetical. To establish the potential reciprocal nature of these associations, we see merit in the use of longitudinal panel designs or experience sampling to tease out dynamic relations between leisure media use, procrastination, and sleep.

All the concepts in this study were assessed with self-report measures. In sleep research, the great majority of studies on media use and sleep have used self-report assessments (Hale & Guan, 2015) and comparative research with objective measures have reported they are equally valid (Wolfson et al., 2003). Yet, it is recommended to complement self-reports of sleep quality with actigraphy or polysomnography to reduce measurement error (Lee, 2016). Our measures also differ with regard to their reference frames (i.e., an *evening* viewing habit vs. *overall* procrastination with TV, guilt *when watching TV* vs. *overall* levels of stress). Future research on the effects of procrastinatory media use on sleep might also want to specify whether respondents are procrastinating from bedtime or not, as this may signal a pre-existing difficulty with sleep that could bias the results. Regarding our measures of TV involvement, we used general TV use items and did not specify particular genres. The literature on media involvement is a rich one, with many strongly related concepts with various operationalizations employed in research. While we have incorporated three subdimensions of involvement in Study 1 and a trait-like assessment of involvement in Study 2, future studies might, for example, assess the cognitive depth of processing related to television involvement, and consider the transportability of viewers with regard to specific television content.

An important limitation pertains to our measures of perceived stress and diurnal preference (see Supplement 1). Compared to the ten-item and 14-item version of the scale, lower reliabilities and factor loadings have been reported for the short four-item scale in previous research (Ingram, Clarke, & Lichtenberg, 2016). Greenwood (1991) reported problems in the dimensionality of the Diurnal Type scale, and we deleted all items that tapped into eveningness to improve model fit. In all, the sub-par results of the CFA's for these measures warrant a note of caution in the interpretation of our results.

Additionally, we queried a general population of adults aged 18 years and above. We did not account for lifestyle factors or coping strategies that might mitigate the negative association between media use and sleep, such as flexible work schedules or daytime napping. How our findings replicate

among adolescents, is an open question for future research. Knowing their intense preoccupation with media, radical shift from larks to owls during puberty, and early rise times due to school schedules, adolescents have been described as a risk group for poor sleep (Carskadon, 2011). Finally, this is one of the first studies to specifically examine the use of television as a tool for procrastination. An intriguing question for future research is whether we can extrapolate from these findings to other media devices. Stronger media habits have been associated with more procrastinatory media use for television, computer, smartphone (Schnauber-Stockmann et al., 2018) as well as Facebook (Meier et al., 2016). While involvement is a universal experience across media, there are nonetheless significant differences, such as that books request imagination from their readers and can be consumed at reader's own pace (although the latter now also applies to TV streaming) (Green et al., 2004), and involvement with interpersonal content on social media or smartphones may trigger increased stress and anxiety related to users' desire to stay connected (i.e., fear of missing out; Przybylski, Murayama, DeHaan, & Gladwell, 2013). The negative appraisal of media use as a form of procrastination has been found for both interactive (videogames) and non-interactive media use (television). Moreover, labels such as "cyberslacking" (Lavoie & Pychyl, 2001) and "smombies" (Duke & Montag, 2017) suggest that many screen activities carry a negative connotation with them as a time-wasting activity. A future study could assess whether negative self-judgment about media use as an activity is more likely for some media than others, or which features of screen media use (e.g., level of interactivity, engagement with certain contents such as hedonic vs. eudaimonic entertainment, or the ratio of time intended to spend vs. actual time spent) are taken into account when negatively appraising the media activity.

Conclusion

Poor sleep has been associated with an increased risk for numerous physical and mental health problems. Given the growing prevalence of media content and communication in our media-saturated culture, identifying the role of procrastinatory media use in sustaining poor sleep is crucial

in order to improve public health. Our findings, while preliminary, signal that media use behavior which may be perceived as relatively harmless – at some point, everyone may have tried to evade his or her responsibilities by turning on the TV – may undermine sleep quality substantially by triggering negative cognitive-affective reactions. While transportation into television entertainment is primarily regarded as a positive experience, it can facilitate a dysfunctional use of television that in turn impairs sleep and daytime functioning. People who habitually watch television during the evening are more inclined to give precedence to television over other obligations, but will likely regret this procrastinatory behavior when going to bed. Finally, we expanded the understanding of procrastinatory media use by bringing the role of diurnal preference to the attention of media researchers.

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Figure 1 Proposed theoretical model

Figure 2 SEM for Study 1

Note. Fit indices are CMIN/df = 2.228, CFI = .943, RMSEA = .041 [.038, .045], SRMR = .060.

Scores in the figure represent standardized path coefficients. Significance levels are based on 2000 bootstrap samples and 95% bias-corrected confidence intervals.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 3 SEM for Study 2

Note. Fit indices are CMIN/df = 2.310, CFI = .927, RMSEA = .050 [.046, .054], SRMR = .055).

Scores in the figure represent standardized path coefficients. Significance levels are based on 2000 bootstrap samples and 95% bias-corrected confidence intervals.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1

Means, Standard Deviations, and Zero-Order Correlations for Study 1

	1.	2.	3.	4.	5.	6.	6a.	6b.	6c.	6d.	6e.	6f.	6g.
1. Morningness Preference	--												
2. Habitual TV Viewing	.003	--											
3. TV Involvement	-.069	.161***	--										
4. Procrastination with TV	-.366***	.204***	.217***	--									
5. Perceived Stress	-.142***	.136***	-.011	.157***	--								
6. Sleep Quality	-.071	.118**	.022	.040	.391***	--							
6a. Subjective Sleep Quality	-.120**	.061	.022	.098**	.330***	.774***	--						
6b. Sleep Latency	-.163***	.109**	.045	.092*	.299***	.687***	.538***	--					
6c. Sleep Duration	.179***	.053	.025	-.051	.070	.585*	.383***	.216***	--				
6d. Sleep Efficiency	.082*	.102**	-.011	-.109**	.188***	.692***	.423***	.404***	.571***	--			
6e. Sleep Disturbance	-.007	.050	.024	.002	.223***	.503***	.352***	.257***	.139***	.258***	--		
6f. Sleep Medication	-.002	.086*	.058	-.038	.194***	.581***	.308***	.211***	.167***	.237***	.256***	--	
6g. Daytime Dysfunction	-.251***	.028	.041	.179***	.391***	.467***	.349***	.187***	.050	.045	.262***	.197***	--
M	10.78	14.08	25.23	9.88	8.65	5.00	.96	1.04	.42	.41	1.06	.39	.69
SD	2.84	6.66	5.44	5.34	2.32	3.24	.72	.93	.72	.78	.43	.91	.73

*p<.05, **p<.01, ***p<.001

Table 2

Means, Standard Deviations, and Zero-Order Correlations for Study 2.

	1.	2.	3.	4.	5.	6.	6a.	6b.	6c.	6d.	6e.	6f.	6g.
1. Morningness Preference	--												
2. Habitual TV Viewing	.017	--											
3. Transportability	-.120**	.125**	--										
4. Procrastination with TV	-.257***	.143**	.190***	--									
5. Guilt	.027	.043	.153***	.303***	--								
6. Sleep Quality	-.100*	.024	.050	.112*	.109*	--							
6a. Subjective Sleep Quality	-.117**	.001	-.017	.138**	.109*	.694***	--						
6b. Sleep Latency	-.151**	.053	.091*	.160***	.076	.655***	.404***	--					
6c. Sleep Duration	.211***	-.052	-.035	-.002	.064	.501**	.247***	.133*	--				
6d. Sleep Efficiency	-.041	-.046	-.038	-.003	-.007	.634***	.300***	.273***	.439***	--			
6e. Sleep Disturbance	-.062	.114**	.036	.037	.075	.525***	.369***	.323***	.093*	.203***	--		
6f. Sleep Medication	.006	.048	.041	-.081	.013	.489***	.153***	.186***	.017	.179***	.170***	--	
6g. Daytime Dysfunction	-.252***	-.002	.109*	.211***	.127**	.541***	.418***	.215***	.107*	.163***	.238***	.110**	--
M	11.03	17.16	19.79	9.86	9.32	4.86	1.06	.91	.43	.40	1.11	.32	.68
SD	2.87	6.65	5.02	4.06	3.81	2.83	.66	.86	.73	.73	.46	.85	.70

*p<.05, **p<.01, ***p<.001

Supplement 1 *Results for the Confirmatory Factor Analyses for Study 1 and 2*

STUDY 1		STUDY 2	
Variable	CFA	Variable	CFA
TV Habit $\alpha = .86$	<ul style="list-style-type: none"> CMIN/df = 4.312; CFI = .995; RMSEA= .067; SRMR= .015, Factor loadings $\geq .680$ 	TV Habit $\alpha = .87$	<ul style="list-style-type: none"> CMIN /df = 4.709; CFI = .993; RMSEA= .084; SRMR= .017 Factor loadings $\geq .600$
Morningness Preference $\alpha = .73$	<ul style="list-style-type: none"> CMIN /df = .757; CFI = 1.000 RMSEA= .000; SRMR= .005 Factor loadings $\geq .48$ Items 2, 3, and 5 of the original scale were removed. The error terms of items 6 and 7 were correlated to improve model fit. 	Morningness Preference $\alpha = .74$	<ul style="list-style-type: none"> CMIN /df = .758; CFI = 1.000; RMSEA= .000; SRMR= .001 Factor loadings $\geq .45$ Items 2, 3, and 5 of the original scale were removed. The error terms of items 6 and 7 were correlated to improve model fit.
TV Involvement $\alpha_{\text{FocusedImmersion}} = .93$ $\alpha_{\text{TimeDissociation}} = .84$ $\alpha_{\text{Enjoyment}} = .83$	<ul style="list-style-type: none"> CMIN /df = 2.553; CFI = .994; RMSEA= .046; SRMR= .026 Factor loadings $\geq .67$. Two items (“<i>I find it interesting</i>” of enjoyment subscale and “<i>I get absorbed in the activity</i>” from focused immersion subscale) were removed to improve model fit. 	Transportability $\alpha = .88$	<ul style="list-style-type: none"> CMIN /df = 4.267; CFI = .983; RMSEA= .079; SRMR= .024 Factor loadings $\geq .62$. Three items (“<i>I sometimes feel as if I am part of the story.</i>”, “<i>I am often impatient to find out how the story ends.</i>”, “<i>I often find that the story has an impact on the way I see things</i>”) with low factor loadings were removed and error terms of two items “<i>I can easily envision myself in the story</i>” and “<i>I have vivid images of the characters</i>” were correlated to improve model fit.
TV as Procrastination $\alpha = .88$	<ul style="list-style-type: none"> CMIN /df = 4.924; CFI = .992 RMSEA= .074; SRMR= .017 Factor loadings: $\geq .63$ Correlated error times of item “<i>I watch TV although I planned on doing other things</i>” and “<i>I watch TV although I would be better off doing other things first</i>” to improve model fit. 	TV as Procrastination $\alpha = .91$	<ul style="list-style-type: none"> CMIN /df = 6.09; CFI = .991 RMSEA= .098; SRMR= .017 Factor loadings: $>.73$ Correlated error terms “<i>I watch TV although I planned on doing other things</i>” and “<i>I watch TV although I would be better off doing other things</i>. Correlated error terms of item “<i>I watch TV although I planned on doing other things</i> and “<i>I watch TV to postpone difficult things</i>” to improve model fit.
Perceived Stress $\alpha = .57$	<ul style="list-style-type: none"> CMIN /df = 7.136; CFI = .955; RMSEA= .092; SRMR= .034 Factor loadings $\geq .35$ Removing lowest loading item did not affect measurement model fit. 	TV Guilt $\alpha = .86$	<ul style="list-style-type: none"> CMIN /df = 3.361; CFI = .991; RMSEA = .067; SRMR= .020 Factor loadings $\geq .61$ Correlated error terms of items “<i>When I watch TV, I feel regret</i>” and “<i>When I watch TV, I feel like I have done something wrong</i>”